Investigation • Just Undo It!

Name _____ **Period** _____ **Date** _____

Step 1 Choose a secret number. Now choose four more nonzero numbers and in any random order add one of them, multiply by another, subtract another, and divide by the final number. Record in words what you did and your final result on a blank sheet of paper. (For example, "I took my secret number, divided by 4, added 7, multiplied by 2, and subtracted 8. The result was 28.") Do not record your secret number. Trade papers with another student.

Step 2 Use the description on the paper given to you to complete the description, sequence, and expression columns in the table below, as shown in the sample table.

Description	Sequence	Expression		
Picked a number.	?	x		
Divided by 4.	Ans / 4	$\frac{x}{4}$		
Added 7.	Ans + 7	$\frac{x}{4} + 7$		
Multiplied by 2.	Ans • 2	$2\left(\frac{x}{4} + 7\right)$		
Subtracted 8.	Ans − 8	$2\left(\frac{x}{4} + 7\right) - 8$		

Description	Sequence	Expression	Undo	Result
Picked a number.	?	x		

Step 3 Now fill in the Undo column in your table, listing the operations needed to undo each step. (See this sample table for guidance.)

Description	Sequence	Expression	Undo	
Picked a number.	?	x		
Divided by 4.	Ans / 4	$\frac{x}{4}$	• (4)	
Added 7.	Ans + 7	$\frac{x}{4} + 7$	− (7)	
Multiplied by 2.	Ans • 2	$2\left(\frac{x}{4} + 7\right)$	/ (2)	
Subtracted 8.	Ans − 8	$2\left(\frac{x}{4} + 7\right) - 8$	+ (8)	

Step 4 In the fifth column of your table, put the final result in the bottom right cell. Then work up the table from the bottom, undoing each operation as shown, to discover the original number, as shown here. Was this the secret number? (In this example the final result was 28 and the original secret number was 44.)

Description	Sequence	Expression	Undo	Result
Picked a number.	?	x		44
Divided by 4.	Ans / 4	$\frac{x}{4}$	• (4)	11
Added 7.	Ans + 7	$\frac{x}{4} + 7$	− (7)	18
Multiplied by 2.	Ans • 2	$2\left(\frac{x}{4} + 7\right)$	/ (2)	36
Subtracted 8.	Ans − 8	$2\left(\frac{x}{4} + 7\right) - 8$	+ (8)	28

Many equations can be solved using a table by undoing each operation, following these steps.

1. Complete the description column using the order of operations.
2. Complete the undo column.
3. Finally, work up from the bottom of the table to solve the equation.

You can check your solution to an equation by substituting the solution into the original equation and evaluating to check that you get a true statement.

Study this example. Next you will create your own table to solve an equation.

Equation: $\frac{3 + 2(x - 4)}{5} + 6 = 11$		
Description	**Undo**	**Result**
Pick x.		15
$-$ (4)	$+$ (4)	11
• (2)	/ (2)	22
$+$ (3)	$-$ (3)	25
/ (5)	• (5)	5
$+$ (6)	$-$ (6)	11

Step 5 Solve this equation using a table: $7 + \frac{x - 3}{4} = 42$. Check your solution.

Equation:		
Description	**Undo**	**Result**
Pick x.		

Step 6 Write a few sentences explaining why this method works to solve an equation.